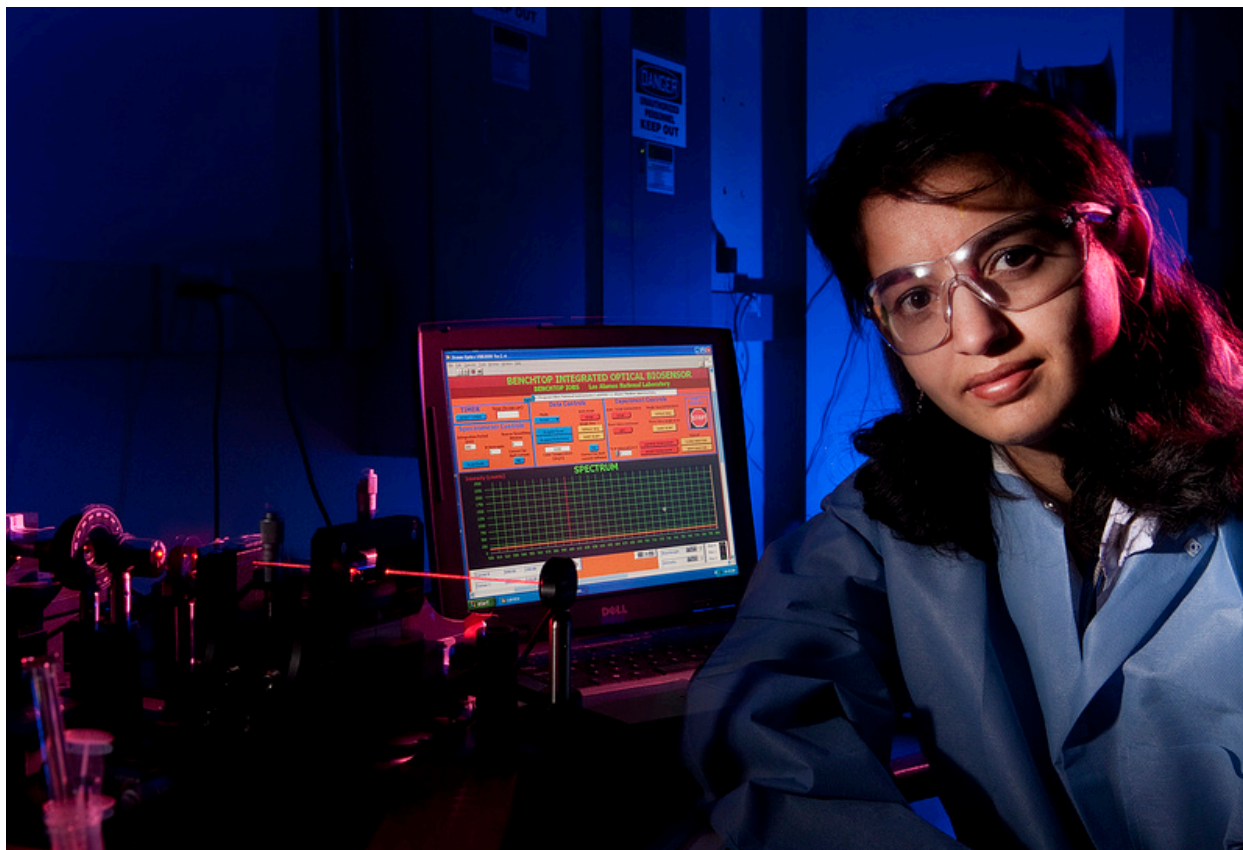


# Today's tuberculosis

March 1, 2015



At the turn of the twentieth century, tuberculosis (TB) was the leading cause of death in the United States, and New Mexico played a key role in helping patients as the nation's "sanatorium state." Without effective drugs available to them until the discovery of the antibiotic streptomycin in the mid-1940s, physicians prescribed a dry climate, sunshine and fresh air in addition to rest, a wholesome diet and a cheerful attitude.

New Mexico not only welcomed the unfortunate wheezing masses but offered tax incentives to encourage the construction of TB hospitals. Among the many "lungers" who flocked to New Mexico to recuperate were notables such as theoretical physicist J. Robert Oppenheimer, who later would direct the Manhattan Project during World War II, and architect John Gaw Meem, who ended up staying in Santa Fe and dedicating his career to the conservation of New Mexico's architectural heritage.

Today, long after the widespread application of streptomycin and other antibiotics abruptly allowed TB to become an oddity in the United States, New Mexico has a front-

row seat in the fight against TB once again, but this time thanks to modern-day TB researchers like Los Alamos' Harshini Mukundan, Basil Swanson and their colleagues.

"Over a third of the world's human population still is infected with *Mycobacterium tuberculosis* in either its inactive (latent) or active form," Mukundan said, "and over a million people still die from the disease each year. While most of the infections occur in developing countries, international travel and commerce make it easier for infectious diseases to spread."

For individuals carrying the human immunodeficiency virus (HIV), co-infection with *Mycobacterium tuberculosis* increases the likelihood of developing active TB and is the leading cause of death in HIV/AIDS patients.

TB in cattle (bovine TB) poses another significant concern for a variety of reasons, including potential economic losses and the chance that the disease can spread to humans through contact with open wounds or the ingestion of unpasteurized milk.

New Mexico's ranches currently are considered to be TB-free, but cattle has to be tested regularly to keep that designation. With long culture incubation periods and high false-positive rates for existing tests, the risks are high.

Luckily, this is where Mukundan and her team come in, because faster and more accurate identification of TB in humans and cattle will reduce its spread.

After years of initial research Mukundan and her colleagues have developed methods which rapidly detect biological molecules (biomarkers) that are secreted by the pathogen and are differentially expressed during disease. Because the altered expressions are signatures produced by the pathogen, the approach can be applied to humans and other animals alike.

The team currently is conducting their second clinical trial in adult humans and is enrolling children in a pediatric study in rural Kenya.

"We also have completed valuable research on cattle with the help of the New Mexico Small Business Assistance program and hope to continue the effort this year," Mukundan said. "Our test took only a few minutes and is less cumbersome and more accurate than the conventional skin test. Things are heading in the right direction."

Mukundan and Swanson's TB project is part of a larger effort to diagnose a range of diseases, including influenza and breast cancer, and relies on the participation of biologists, chemists, engineers and materials science experts. The resultant "Science of Signatures" technology has won numerous awards for scientific innovation and commercialization.

To learn more about the New Mexico Small Business Assistance program, visit the [NSBA](#) website.

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